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(54) **POWER CONTROL METHOD AND DEVICE FOR HIGH SPEED SHARED INFORMATION CHANNEL**

(57) A power control method and device for High Speed Shared Information Channel (HS-SICH) are provided. A first mode and a second mode configured with different code channel resource are set; the power for transmitting HS-SICH in the first mode and the power for transmitting HS-SICH in the second mode are set in a fixed proportion, and according to the fixed proportion,

an adjustment value of the first power offset is determined; the power for transmitting HS-SICH in the adjustment mode is obtained by adding the adjustment value of the first power offset to the determined power for transmitting HS-SICH in the first mode, so that it can realize that different power is provided for HS-SICH configured with different code channel resources.

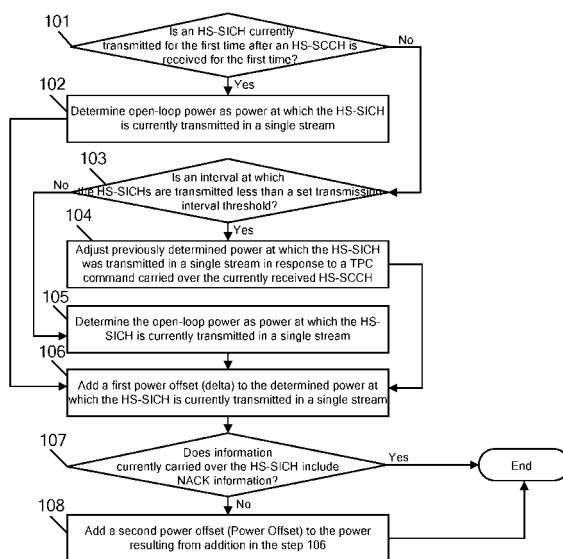


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to the field of the 3rd generation (3G) mobile communications and particularly to a power control method and device for a High Speed-Shared Information Channel (HS-SICH).

Background of the Invention

[0002] In order to satisfy a demand for a high speed mobile data service, a technology of High Speed Downlink Packet Access (HSDPA) has been proposed in the protocol of 3GPP R5 primarily for the purpose of supporting a high speed packet data service and a required high data transmission rate and obtaining a lower delay, a higher system throughput and a further guaranteed Quality of Service (QoS).

[0003] The HSDPA downlink involves two channels of a High Speed-Shared Control Channel (HS-SCCH) and a High Speed-Downlink Shared Channel (HS-DSCH), where downlink service data is carried over the HS-DSCH which is shared between a plurality of User Equipments (UE) through time division multiplexing and code division multiplexing and which may be mapped to more than one High Speed-Physical Downlink Shared Channel (HS-PDSCH); and scheduling and control information of the HS-DSCH is carried over the HS-SCCH, and a UE instructs demodulation and decoding of downlink data according to a result of decoding the HS-SCCH. The HSDPA uplink involves a High Speed-Shared Information Channel (HS-SICH) over which a UE feeds back a Channel Quality Indicator (CQI) of downlink quality information and an acknowledgement (ACK) or non-acknowledgement (NACK) message for transmission data upon reception of the HS-SCCH.

[0004] Hereinafter transmission of the carried scheduling and control information over the HS-SCCH will be referred simply to as transmission of the HS-SCCH and transmission of the carried feedback information over the HS-SICH will be referred simply to as transmission of the HS-SICH.

[0005] In present, power control for the HS-SICH is performed in an open-loop assisted with closed-loop mode as briefly described below.

[0006] When a UE transmits the HS-SICH for the first time after receiving the HS-SCCH for the first time, an invalid Transmit Power Control (TPC) command is carried over the HS-SCCH received for the first time and power can not be adjusted in response thereto, so open-loop power control shall be performed. Under the open-loop power control, a Radio Network Controller (RNC) configures desired reception power, and the UE adds its own measured value of a path loss to this desired value resulting in power at which the HS-SICH is transmitted under the open-loop power control. The RNC configures the desired reception power according to the 3GPP RS

25.331, and a detailed description thereof will be omitted here.

[0007] Since the HS-SICH is characterized in discrete scheduling, it is necessary to determine an interval between current transmission of the HS-SICH and previous transmission of the HS-SICH for the purpose of determining whether there is good correlation between the current transmission of the HS-SICH and the previous transmission of the HS-SICH. For this purpose of determination, firstly the RNC sets a transmission interval threshold of the HS-SICH dependent upon correlation of the radio control channels, and this set transmission interval threshold may also be adjusted dynamically by the RNC as needed.

[0008] Next, the UE compares a measured value of the transmission interval at which the UE transmits the HS-SICHs with the threshold, and if the measured value of the transmission interval at which the UE transmits the HS-SICHs is less than the threshold, it indicates good correlation between the current transmission of the HS-SICH and the previous transmission of the HS-SICH, and closed-loop power control may be performed, that is, the UE may adjust previous power in response to the TPC command carried over the currently received HS-SCCH, and if allowed over a network, add a further compensation value for a variation of the path loss; or if the measured value of the transmission interval at which the UE transmits the HS-SICHs is more than or equal to the threshold, it indicates poor correlation between the current transmission of the HS-SICH and the previous transmission of the HS-SICH, so open-loop power control shall be performed so as to guarantee the quality of the control channel, that is, the UE adds its own measured value of the path loss to the desired reception power configured by the RNC resulting in power at which the HS-SICH is transmitted under the open-loop power control.

[0009] Regardless of whether open-loop or closed-loop power control, if information carried over the currently transmitted HS-SICH is ACK information, a further power offset (Power Offset) configured by the RNC shall be added to power at which the HS-SICH is currently transmitted.

[0010] The foregoing power control for the HS-SICH in the prior art relates to such a case that information is fed back over the HS-SICH for only one code channel resource configuration, but a demand has emerged at present for switching between different code channel resource configurations for the HS-SICH. In an application of the technology of Multiple Input Multiple Output (MIMO) combined with the technology of HSDPA, for example, if downlink data in the existing HSDPA is regarded as one data stream (referred below to as a single stream), two concurrent downlink data streams (referred below to as dual streams) may be supported in combination with the mode of MIMO, and switching between single stream and dual streams will take place over time with a varying channel condition. Therefore, it is necessary for the UE to feed back information correspondingly in single stream

and dual streams, and in this case, different code channel resources shall be configured for the HS-SICH and the HS-SICH shall be transmitted at different power. However, a solution to address this issue is absent in the existing power control method for the HS-SICH.

Summary of the Invention

[0011] A first object of the invention is to provide a power control method for an HS-SICH in which an HS-SICH configured with a varying code channel resource can be provided with varying power.

[0012] A second object of the invention is to provide a power control device for an HS-SICH in which an HS-SICH configured with a varying code channel resource can be provided with varying power.

[0013] Technical solutions of the invention are defined in the claims.

[0014] Apparently, a reference mode and an adjusting mode in which the HS-SICHs are transmitted are set and configured with different code channel resources, a fixed proportion is set between power at which the HS-SICH is transmitted in the adjusting mode and power at which the HS-SICH is transmitted in the reference mode, and a first power offset is derived from the fixed proportion. Each time the HS-SICH is intended to be transmitted, firstly the power at which the HS-SICH is currently transmitted in the reference mode, and if the HS-SICH is accurately intended to be transmitted in the reference mode, the HS-SICH is transmitted directly at the determined power; or if the HS-SICH is accurately intended to be transmitted in the adjusting mode, the first power offset is added to the determined power resulting in the power at which the HS-SICH is transmitted in the adjusting mode, thereby enabling provision of varying power for the HS-SICH configured with a varying code channel resource.

Brief Description of the Drawings

[0015] Fig. 1 is a flow chart of an embodiment of a power control method for an HS-SICH according to the invention; and

[0016] Fig. 2 is a schematic structural diagram of a power control device for an HS-SICH according to an embodiment of the invention.

Detailed Description of the Embodiments

[0017] The invention will be further described in details below with reference to the drawings and embodiments to make the objects and advantages of the invention more apparent.

[0018] In a power control method for an HS-SICH according to an embodiment of the invention, two modes are set in which HS-SICHs are transmitted, which may be referred respectively to as a reference mode and an adjusting mode configured with different code channel

resources. Power at which the HS-SICH is transmitted in the adjusting mode is set at a fixed proportion to power at which the HS-SICH is transmitted in the reference mode, and a first power offset (Δ) is derived from the fixed proportion.

[0019] In an embodiment of the invention, if the same performance is required to be achieved in the reference mode and the adjusting mode and there is a fixed proportion, denoted with a , of a code channel resource configured in the adjusting mode to that configured in the reference mode, there is the same fixed proportion, also denoted with a , of the amount of information carried in the adjusting mode to that carried in the reference mode, and the same fixed proportion, also denoted with a , shall also be set between power at which the HS-SICH is transmitted in the adjusting mode and power at which the HS-SICH is transmitted in the reference mode.

[0020] In order to perform power control for the HS-SICH in an embodiment of the invention under the foregoing conditions, firstly power at which the HS-SICH is currently transmitted in the reference mode is determined as reference power, and also several implementations in which power at which the HS-SICH is transmitted will be presented in the following embodiments; and secondly if the HS-SICH is currently transmitted in the reference mode, it may be transmitted directly at the determined power, or if the HS-SICH is currently transmitted in the adjusting mode, the first power offset (Δ) is added to the determined power resulting in power at which the HS-SICH is transmitted in the adjusting mode, and the HS-SICH is transmitted at this power in the adjusting mode.

[0021] An embodiment of the power control method for the HS-SICH according to the invention will be presented in an application scenario as follows: the technology of MIMO is combined with the technology of HSDPA, the HS-SICH is transmitted in a single stream in the reference mode and in dual streams in the adjusting mode, where 8-bit single-stream feedback information including 1-bit ACK or NACK information, 6-bit TBS index information and 1-bit modulation mode information is carried over a first code channel resource with a spreading factor of 16 when the HS-SICH is intended to be transmitted in a single stream, and 16-bit dual-stream feedback information including 2-bit ACK or NACK information, 12-bit TBS index information and 2-bit modulation mode information is carried over a second code channel resource with a spreading factor of 8 when the HS-SICH is intended to be transmitted in dual streams.

[0022] Apparently, in the present embodiment, when the HS-SICH is transmitted in dual streams, the code channel resource is twice that in single-stream transmission and the amount of carried information is also twice that in single-stream transmission, for both of which the same fixed proportional relationship holds. As can be apparent from this, in order to achieve the same required performance in single-stream transmission and dual-stream transmission, power at which the HS-SICH is transmitted in dual streams shall also be twice power at

which the HS-SICH is transmitted in a single stream, and the difference thereof which may be represented as 3dB in a general unit of power, so the first power offset (Δ) in this embodiment may be 3dB. Of course, if a specific margin is required to be set in a practical application, this first power offset (Δ) may alternatively be set as a value more than 3dB, and the margin may be determined dependent upon an implementation of the physical layer. Since the HS-SICH is transmitted in a single stream as in the prior art, the following flow of the method relates only to a flow of transmitting the HS-SICH in dual streams, and in a practical application, if the HS-SCCH is received in a single stream, the HS-SICH may be transmitted in a single stream as in the prior art, or if the HS-SCCH is received in dual streams, the HS-SICH may be transmitted in dual streams in the following flow of the method.

[0023] Fig. 1 is a flow chart of an embodiment of a power control method for an HS-SICH according to the invention, and the flow includes the following steps.

[0024] The step 101 is to determine whether an HS-SICH is currently transmitted for the first time after an HS-SCCH is received for the first time, and if so, the flow goes to the step 102; otherwise, the flow goes to the step 103.

[0025] The step 102 is to determine open-loop power as power at which the HS-SICH is currently transmitted in a single stream, and the flow goes to the step 106.

[0026] In this step, open-loop power is a sum of the desired reception power configured by the RNC and the path loss measured by the UE as in the prior art.

[0027] The step 103 is to determine whether an interval at which the HS-SICHs are transmitted is less than a set transmission interval threshold, and if so, the flow goes to the step 104; otherwise, the flow goes to the step 105.

[0028] In this step, if the HS-SICH currently transmitted is not after the HS-SCCH is received for the first time, an interval at which the HS-SICHs are transmitted shall be further determined, particularly by determining whether an interval between current transmission of the HS-SICH and previous transmission of the HS-SICH is less than the transmission interval threshold set by the RNC to thereby determine correlation between transmission of the HS-SICHs.

[0029] The step 104 is to adjust previously determined power at which the HS-SICH was transmitted in a single stream in response to a TPC command carried over the currently received HS-SCCH, and then the flow goes to the step 106.

[0030] In this step, the adjusted power is power at which the HS-SICH is currently transmitted in a single stream. The TPC command is generated from the previous HS-SICH at the transmission end of the HS-SCCH, and regardless of whether the previous HS-SICH is configured with a first code channel resource or a second code channel resource, the transmission end of the HS-SCCH may still comply with how a TPC command word is generated in the prior art, that is, it may measure a value of Signal to Noise Ratio (SNR), compare the meas-

ured value with a target value of SNR configured by the RNC and generate the TPC according to a comparison result. If allowed over a network, a compensation for a variation of the path loss may further be added in the closed-loop power control of this step.

[0031] The step 105 is to determine the open-loop power as power at which the HS-SICH is currently transmitted in a single stream.

[0032] The foregoing steps 101 to 105 have been described in this embodiment where power at which the HS-SICH is currently transmitted in a single stream is determined as reference power in an open-loop assisted with closed-loop mode. If the HS-SICH is currently transmitted in a single stream, the HS-SICH is transmitted directly at the determined power. Since single stream transmission of the HS-SICH is well known in the prior art, a detailed description thereof will be omitted here, and only dual-stream transmission of the HS-SICH will be described in details below.

[0033] The step 106 is to add a first power offset (Δ) to the determined power at which the HS-SICH is currently transmitted in a single stream.

[0034] In this step, a set margin is further added if the margin is set dependent upon an implementation of the physical layer.

[0035] The step 107 is to determine whether information currently carried over the HS-SICH includes NACK information, and if so, the flow ends; otherwise, the flow goes to the step 108.

[0036] A power adjusting mechanism for ACK/NACK in the case that the HS-SICH is transmitted in dual streams has been presented in this step. Since information carried over the HS-SICH in dual-stream transmission is equivalent to two branches of feedback information, and if NACK information is included in one of the branches, inclusion of NACK information in the information currently carried over the HS-SICH is determined.

[0037] The step 108 is to add a second power offset (Power Offset) to the power resulting from addition in the step 106, and the flow ends.

[0038] In this step, the second power offset (Power Offset) is set by the RNC as in the prior art.

[0039] In order to perform the power control method for the HS-SICH according to the invention, the invention further proposes a power control device for an HS-SICH which is located at the UE side and which may be integrated in the UE or may be a separate device connected with the UE.

[0040] Fig. 2 is a schematic structural diagram of a power control device for an HS-SICH according to the invention, which includes a power offset determination module and a power control module.

[0041] The power offset determination module is configured to derive a first power offset from a set fixed proportion between power at which an HS-SICH is transmitted in an adjusting mode and power at which the HS-SICH is transmitted in a reference mode and transmit the first power offset to the power control module.

[0042] The power control module is configured to determine the power at which the HS-SICH is currently transmitted in the reference mode and add the first power offset to the determined power at which the HS-SICH is currently transmitted in the reference mode resulting in the power at which the HS-SICH is transmitted in the adjusting mode.

[0043] Alike, if the device according to the invention is applied in the scenario where the technology of MIMO is combined with the technology of HSDPA, transmission of the HS-SICH in the reference mode described in the device is single-stream transmission of the HS-SICH and transmission of the HS-SICH in the adjusting mode is dual-stream transmission of the HS-SICH. In this case, the power control module may also perform power control in the open-loop assisted with closed-loop mode. The power control module includes an open-loop power control unit and a closed-loop power control unit.

[0044] When the HS-SICH is currently transmitted for the first time after an HS-SCCH is received for the first time, the open-loop power control unit is configured to add a measured path loss to desired reception power configured by the RNC resulting in the power at which the HS-SICH is currently transmitted in a single stream and add the first power offset to the power at which the HS-SICH is currently transmitted in a single stream resulting in the power at which the HS-SICH is transmitted in dual streams. Furthermore, the open-loop power control unit may add a further margin set dependent upon an implementation of the physical layer together with the first power offset to the power at which the HS-SICH is currently transmitted in a single stream.

[0045] When the HS-SICH currently transmitted is not after the HS-SCCH is received for the first time, the closed-loop power control unit is configured to adjust previously determined power at which the HS-SICH was transmitted in a single stream to obtain the power at which the HS-SICH is currently transmitted in a single stream in response to a TPC command carried in the currently received HS-SCCH and add the first power offset to the adjusted power resulting in the power at which the HS-SICH is transmitted in dual streams.

[0046] In the case of closed-loop power control, if correlation between transmission of the HS-SICHs is taken into account, the closed-loop control unit includes a transmission interval determination sub-unit, a trigger sub-unit, a closed-loop power control performing sub-unit and an assistant open-loop power control sub-unit.

[0047] The transmission interval determination sub-unit is configured to determine, from a transmission interval threshold of the HS-SICH configured by the RNC, whether an interval between current transmission of the HS-SICH and previous transmission of the HS-SICH is more than or equal to the threshold.

[0048] The trigger sub-unit is configured to trigger the assistant open-loop power control sub-unit to operate when the transmission interval determination sub-unit determines that the interval between the current trans-

mission of the HS-SICH and the previous transmission of the HS-SICH is more than or equal to the threshold and trigger the closed-loop power control performing sub-unit to operate when the transmission interval determination sub-unit determines that the interval between the current transmission of the HS-SICH and the previous transmission of the HS-SICH is less than the threshold.

[0049] The closed-loop power control performing sub-unit is configured to be triggered by the trigger sub-unit to adjust the previously determined power at which the HS-SICH is transmitted in a single stream to obtain the power at which the HS-SICH is currently transmitted in a single stream in response to the Transmission Power Control (TPC) command carried in the currently received HS-SCCH, add a compensation for a variation of the path loss if allowed over a network and add the first power offset to the adjusted power resulting in the power at which the HS-SICH is transmitted in dual streams.

[0050] The assistant open-loop power control sub-unit is configured to be triggered by the trigger sub-unit to add the measured path loss to the desired reception power configured by the RNC resulting in the power at which the HS-SICH is currently transmitted in a single stream and add the first power offset to the power at which the HS-SICH is currently transmitted in a single stream resulting in the power at which the HS-SICH is transmitted in dual streams. The assistant open-loop power control sub-unit may add a further margin set dependent upon an implementation of the physical layer together with the first power offset to the power at which the HS-SICH is currently transmitted in a single stream.

[0051] In order to perform the ACK/NACK mechanism in dual-stream transmission of the HS-SICH in the method, the power control device for the HS-SICH according to the invention may further include a carried information determination module configured to determine whether dual-stream feedback information currently carried over the HS-SICH includes NACK information, and if so, no operation is performed; otherwise, a further second power offset configured by the RNC is added to the power at which the HS-SICH is transmitted in dual streams as derived by the open-loop power control unit or the closed-loop power control unit resulting in resultant power at which the HS-SICH is transmitted in dual streams.

[0052] In conclusion, the foregoing is merely illustrative of the preferred embodiments of the invention but not intended to limit the scope of the invention. Any modifications, equivalent substitutions and adaptations made without departing from the scope and principle of the invention shall come into the scope of the invention.

Claims

1. A power control method for a High Speed-Shared Information Channel, comprising: setting a first mode and a second mode, in which the High Speed-Shared Information Channel, HS-SICH, is transmit-

ted, with the first mode being corresponding to a first code channel resource and the second mode being corresponding to a second code channel resource; and setting a fixed proportion between power at which the HS-SICH is transmitted in the second mode and power at which the HS-SICH is transmitted in the first mode and deriving a first power offset from the fixed proportion, wherein the method further comprises:

determining the power at which the HS-SICH is transmitted in the first mode for intended transmission of the HS-SICH; and
adding the preset first power offset to the determined power at which the HS-SICH is transmitted in the first mode resulting in the power at which the HS-SICH is transmitted in the second mode.

2. The method of claim 1, wherein transmission of the HS-SICH in the first mode is single-stream transmission of the HS-SICH and transmission of the HS-SICH in the second mode is dual-stream transmission of the HS-SICH.
3. The method of claim 2, wherein intended transmission of the HS-SICH is the HS-SICH being transmitted for the first time after a High Speed-Shared Control Channel, HS-SCCH, is received for the first time; and
determining the power at which the HS-SICH is transmitted in the first mode comprises: adding a measured value of a path loss to desired reception power configured by a Radio Network Controller, RNC, resulting in open-loop power and determining the open-loop power as the power at which the HS-SICH is transmitted in a single stream.
4. The method of claim 2, wherein intended transmission of the HS-SICH is other than transmission of the HS-SICH after an HS-SCCH is received for the first time; and
determining the power at which the HS-SICH is transmitted in the first mode comprises: adjusting previously determined power at which the HS-SICH was transmitted in a single stream to obtain the power at which the HS-SICH is currently transmitted in a single stream in response to a Transmission Power Control, TPC, command carried over the currently received HS-SCCH.
5. The method of claim 4, further comprising: before adjusting the previously determined power at which the HS-SICH was transmitted in a single stream, determining whether a transmission interval between current transmission of the HS-SICH and previous transmission of the HS-SICH is more than or equal to a transmission interval threshold configured

by an RNC; and

if so, adding a measured value of a path loss to desired reception power configured by the RNC resulting in open-loop power and determining the open-loop power as the power at which the HS-SICH is currently transmitted in a single stream; otherwise, proceeding with the step of adjusting the previously determined power at which the HS-SICH was transmitted in a single stream.

6. The method of claim 5, further comprising: after adjusting the previously determined power at which the HS-SICH was transmitted in a single stream, adding a compensation value for a variation of a path loss to the adjusted power.
7. The method of claim 2, further comprising: after deriving the power at which the HS-SICH is transmitted in the second mode,
determining whether dual-stream feedback information carried over the HS-SICH comprises an NACK message; and
if so, performing no operation;
otherwise, adding a further second power offset configured by an RNC to the derived power at which the HS-SICH is transmitted in dual streams resulting in resultant power at which the HS-SICH is transmitted in dual streams.
8. The method of claim 1, wherein a further preset margin is added together with the first power offset to the power at which the HS-SICH is transmitted in the first mode.
9. A power control device for a High Speed-Shared Information Channel, comprising:

a power offset determination module configured to derive a first power offset from a set fixed proportion between power at which an HS-SICH is transmitted in a second mode and power at which the HS-SICH is transmitted in a first mode and transmit the first power offset to a power control module; and
the power control module configured to determine the power at which the HS-SICH is transmitted in the first mode and add the first power offset to the determined power at which the HS-SICH is currently transmitted in the first mode resulting in the power at which the HS-SICH is transmitted in the second mode.
10. The device of claim 9, wherein transmission of the HS-SICH in the first mode is single-stream transmission of the HS-SICH and transmission of the HS-SICH in the second mode is dual-stream transmission of the HS-SICH; and
the power control module comprises:

an open-loop power control unit, when the HS-SICH is transmitted for the first time after an HS-SCCH is received for the first time, configured to add a measured value of a path loss to desired reception power configured by an RNC resulting in open-loop power and determine the open-loop power as the power at which the HS-SICH is transmitted in a single stream, and add the first power offset to the power at which the HS-SICH is transmitted in a single stream resulting in the power at which the HS-SICH is transmitted in dual streams; and

a closed-loop power control unit, when the HS-SICH transmitted is not after the HS-SCCH is received for the first time, configured to adjust previously determined power at which the HS-SICH is transmitted in a single stream to obtain the power at which the HS-SICH is currently transmitted in a single stream in response to a Transmission Power Control, TPC, command carried in the currently received HS-SCCH and add the first power offset to the adjusted power resulting in the power at which the HS-SICH is transmitted in dual streams.

11. The device of claim 10, wherein the closed-loop control unit comprises:

a transmission interval determination sub-unit configured to determine, from a transmission interval threshold of the HS-SICH configured by an RNC, whether an interval between current transmission of the HS-SICH and previous transmission of the HS-SICH is more than or equal to the threshold;

a trigger sub-unit configured to trigger the assistant open-loop power control sub-unit to operate when the transmission interval determination sub-unit determines that the interval between the current transmission of the HS-SICH and the previous transmission of the HS-SICH is more than or equal to the threshold and trigger a closed-loop power control performing sub-unit to operate when the transmission interval determination sub-unit determines that the interval between the current transmission of the HS-SICH and the previous transmission of the HS-SICH is less than the threshold;

the closed-loop power control performing sub-unit configured to be triggered by the trigger sub-unit to adjust the previously determined power at which the HS-SICH is transmitted in a single stream to obtain the power at which the HS-SICH is currently transmitted in a single stream in response to the Transmission Power Control, TPC, command carried in the currently received HS-SCCH, and add the first power offset to the adjusted power resulting in the power at which

the HS-SICH is transmitted in dual streams; and the assistant open-loop power control sub-unit is configured to be triggered by the trigger sub-unit to add the measured value of the path loss to the desired reception power configured by the RNC resulting in the open-loop power and determine the open-loop power as the power at which the HS-SICH is transmitted in a single stream, and add the first power offset to the power at which the HS-SICH is transmitted in a single stream resulting in the power at which the HS-SICH is transmitted in dual streams.

12. The device of claim 11, wherein the closed-loop power control performing sub-unit is further configured to add a compensation value for a variation of the path loss to the adjusted power after adjusting the previously determined power at which the HS-SICH is transmitted in a single stream.

13. The device of claim 10, further comprising:

a carried information determination module configured to determine whether dual-stream feedback information carried over the HS-SICH comprises NACK information, and if so, no operation is performed; otherwise, a further second power offset configured by the RNC is added to the power at which the HS-SICH is transmitted in dual streams as derived by the open-loop power control unit or the closed-loop power control unit resulting in resultant power at which the HS-SICH is transmitted in dual streams.

14. The device of claim 9, wherein the power control module is further configured to add a further preset margin together with the first power offset to the power at which the HS-SICH is transmitted in the reference mode.

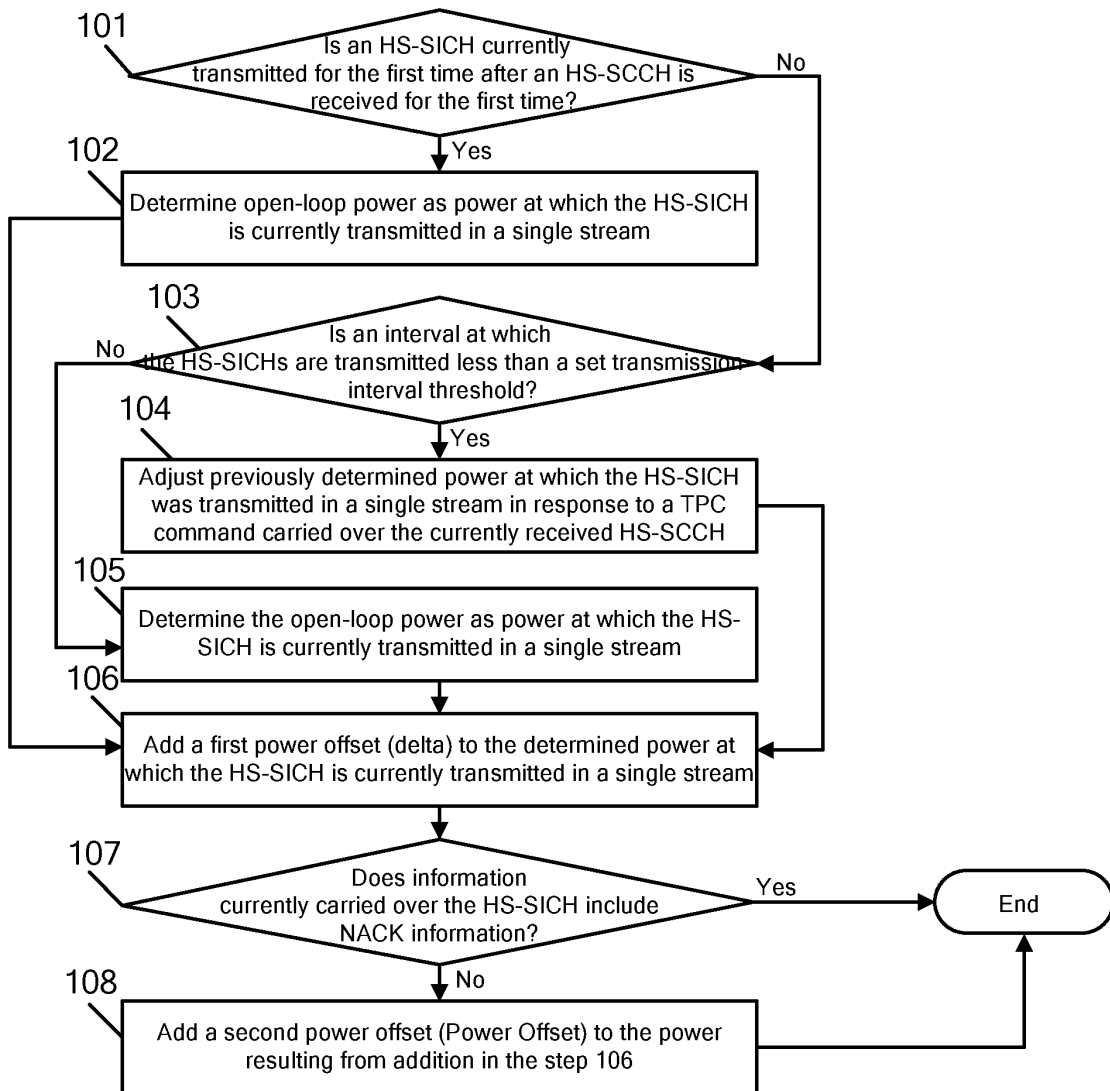


Fig. 1

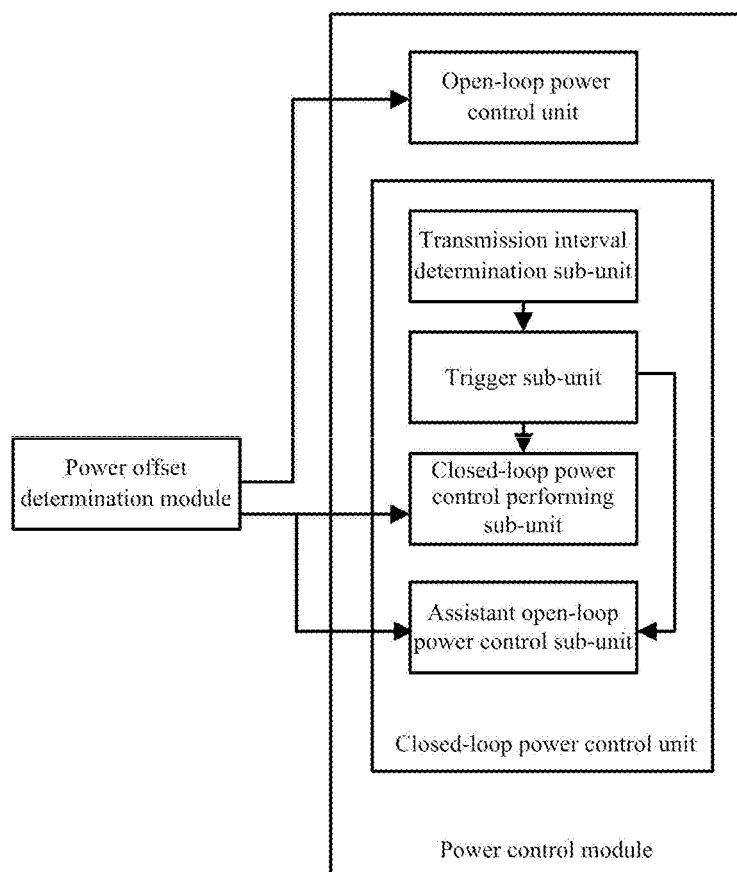


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2009/075704

A. CLASSIFICATION OF SUBJECT MATTER

H04W52/00(2009.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04W52/-, H04B7/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CPRS, WPI, EPODOC: HS-SICH, HSSICH, HIGH W SPEED W SHARED W INFORMATION W CHANNEL, POWER, OFFSET, CONTROL+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN101083491A(ZTE COMMUNICATION CO LTD) 05 Dec. 2007(05.12.2007) the whole document	1-14
A	CN1750428A(ZTE COMMUNICATION CO LTD) 22 Mar. 2006(22.03.2006) the whole document	1-14
A	CN101207416A(ZTE COMMUNICATION CO LTD) 25 Jun. 2008(25.06.2008) the whole document	1-14
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Date of the actual completion of the international search
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2009/075704

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